Steel furniture door

Description

The invention relates to a steel furniture door of the type outlined in the introductory part of claim1.

Sheet steel constructions have been adopted for numerous applications because they are relatively simple to manufacture, transport and erect. In office and workshop units, furniture constructions of this type have proved to be robust and practical.

It is common practice to adhere honeycomb board between door shells of steel furniture doors to insulate against structure-borne noise. As a result of its hygroscopic action, board becomes slightly damp and can then become a source of germs. One known approach is to coat the honeycomb board with phenolic resin or impregnate it with an anti-fungal preparation. However, this is very expensive and does not entirely eliminate the problem. Another disadvantage is the fact that, being a composite material, the coated board has to be separately disposed of.

Joining the door is another problem because the visible surfaces must not be impaired or damaged during the joining process and the sheet metal parts may have to be taken apart again. The joins are often made by welding, but this can lead to burning and weld seams that are visually perceptible.

Another option would be to bond the door parts. However, a reliable connection can not be achieved at a reasonable cost using this technology because climatic influences (temperature, moisture) impair durability in many application environments.

A major objective of the invention is to develop a steel furniture door with an insulation insert which can be completely recycled and is not able to absorb moisture and which is less complicated to produce than it is using the conventional technique. For recycling purposes, it must be possible to process the door incorporating the insulation without generating toxic or environmentally harmful products. Another objective of the invention is to make different designs possible. Using the most economic means and for a low capital outlay, it should be possible to produce a new type of connection between door-sheet metal components without incurring high costs, which can be joined readily, rapidly and by reliable processing.

The main characteristic features of the invention are specified in claim 1. Claims 2 to 11 illustrate embodiments of the invention.

As defined in claim 1, the invention is based on a steel furniture door with two sheet metal shells and an insulation insert adhered in between, incorporating a honeycomb board inside a waterproof foil cover, and the two door shells are detachably affixed to one another by catch means. On the one hand, the construction provides the best possible protection against climatic influences and, on the other hand, it is now possible to take the door shells apart if necessary. A door of this type can even used in damp rooms without resulting in problems, and the risk of germs can be ruled out in any event provided no mechanical damage occurs.

It is of particular advantage if, as specified in claim 2, one of the door shells can be located in the other door shell whilst at the same time securing the insulation insert in the correct position. With this approach, an outer shell and an inner shell are joined to one another by a new type of positive and/or non-positive sheet metal joining technique.

As specified in claim 3, the insulation insert is intimately bonded to the internal face of one door shell before the door shells are latched to one another. This significantly improves the damping value of structure-borne noise. Since the honeycomb board is sufficiently strong, no other fixing means are needed for the connection; the effort involved in production is reduced accordingly. The result is a stable connection between the sheet metal parts, which is capable of absorbing relatively high loads.

A construction advantage is gained by the embodiment specified in claim 4 whereby one of the door shells has an inwardly directed edge-folded piece at each of the two oppositely lying edges and the other door shell has folded edges with at least one outwardly directed part at two corresponding oppositely lying edges which can be latched onto each folded piece. The shaping process used is simple from the point of view of manufacturing technology as well as being economic; assembly is very rapid.

The system is enhanced if, as specified in claim 5, the folded piece has a stop directed towards the internal face of the one door shell, for example a free turned-out edge, a rolled edge or a flanged edge or similar. As defined in claim 6, the folded edges of the other door shell may be designed in the form of a step at one edge and a catch spring at an oppositely lying edge. Designed in this manner, the door shells can be effortlessly latched to one another but can also be taken apart from one another if necessary. This being the case, it is very much of advantage if the step extends on the one inner shell edge along essentially its entire length, as specified in claim 7, and can be fixed to the stop so that it engages underneath it in at least a non-positive fit. This results not only in a localised fixing point but also an effective latching action on relatively large surfaces.

The latter action is essentially assisted due to the fact that the step is of a

three-legged design as specified in claim 8 and comprises an abutment-leg essentially standing out from the surface of the inner shell at a right angle, adjoined by an outwardly pointing under-hooking leg and a terminal leg folded downwards from the latter, preferably at a right angle or acute angle. This provides optimal support on the co-operating edge-folded piece of the outer shell. The catch spring engages on the oppositely lying edge-folded piece and to this end has a camber, rib, clip edge or similar which can be secured on the stop, as specified in claim 9. It may also have a guide ramp or camber as specified in claim 10.

To provide a more visually attractive shape and facilitate production-processing as well as making cleaning more convenient, it is useful if the abutment leg and the catch spring of the inner shell match the depth and design of the respective co-operating outer shell-stop, in which case the terminal leg of the step can act as a spacer piece. The external face of the latched inner shell then sits flush with a top face of the outer shell-folded piece. The sheet metal parts can be joined to one another, having been painted a different or the same type of colour, depending on the desired design.

Other features, details and advantages of the invention may be found in the claims and in the description of examples of embodiments given below with reference to the drawings. Of these:

Fig. 1 shows the components of the steel furniture door, in partial cross-section, viewed from an angle,

Fig. 2 is a view of the door components in cross-section at the start of the process of joining them,

Fig. 3 is a view in cross-section showing the joined components of a steel furniture door corresponding to that illustrated in Fig. 2 and

Fig. 4 is a view of an insulation insert, seen from an angle.

The steel furniture door illustrated in Fig. 1 and denoted generally by reference 10 has an outer shell 12, an insulation insert 14 and an inner shell 16. The latter has recesses 22, 24 for hinges or closing mechanisms (not illustrated). Disposed between the two door shells 12, 16 is an insulation insert 14 which - as may be seen from a corner that is broken open - has a honeycomb structure and is enclosed by a foil 18. The latter has edges projecting out at the narrow sides, which are closed in an overlapping arrangement to form sealing folds 20.

The outer shell 12 is provided with a folded piece 30 turned back towards the internal face, and has a stop 32 and a top face 34. It co-operates with components of the inner shell 16, which has a step 26 along one longitudinal side and a catch spring 28 along the oppositely lying longitudinal side.

The areas of these folded parts of the sheet metal, indicated by circles, are illustrated in cross-section on a larger scale. As may be seen from these diagrams, the step 26 has a downwardly directed abutment leg 35, an outwardly directed under-hooking leg and an inwardly springing folded-back terminal leg 37, which simultaneously forms a spacer with respect to the internal face of the outer shell 12 (Figs. 2 and 3). The catch spring 28 has a camber or rib or clip edge 38, adjoined by a guide ramp or guide camber 39.

Figure 2 illustrates how an inner shell 16 incorporating the step 26 is placed on the one (right-hand) folded piece 30 of the outer shell 12 so that the catch spring 28 moves into abutment with the inner region of the folded piece 30 on

the oppositely lying longitudinal edge. The inner shell 16, to which the insulation insert 14 has already been secured by bonding, is then pushed in the direction indicated by the arrow in Fig. 2 so that the clip edge 28 latches on the stop edge 32 (Fig. 3). As this happens, the surface of the insulation insert 14 that was not previously bonded lies tightly against the internal face of the outer shell 12, where a full-surface bonding is also achieved as a result.

The insulation insert 14 is made from a honeycomb board W (Fig. 4), which is enclosed in an aluminium foil 18 coated with glue on both sides. An overlap at the narrow ends of the insulation insert 14 forms water-tight sealing folds 20 at the two ends or terminal faces. It is expedient if at least one fold 20 can be anchored on or in at least one of the door shells 12 or 16, namely on pre-punched or stamped sheet metal projections, tabs or similar, so that the insulation insert 14 is reliably secured in the correct position in the door interior.

The door 10 can be assembled without any problems as a result of the inwardly directed edges on the door shells 12, 16. The folds or creases may be made using conventional technology. The shape and dimensions of the folded piece 30 on the one hand and the step 26 as well as the catch spring 28 on the other determine the distance between outer shell 12 and inner shell 16. The shape of the fold guarantees a connection that is both simple and reliable and capable of absorbing relatively high forces; however, the connection can be taken apart if necessary. To this end, a tool (not illustrated) may be used on a lock bore 40 (Fig. 1), which simultaneously serves as a gripping hole or gripping point.

The invention is not restricted to the embodiments illustrated as examples here and may be modified in numerous ways. However, it is evident that, in a preferred embodiment, a steel furniture door 10 of the type proposed by the

invention comprises two sheet metal shells 12, 16 with an insulation insert 14 bonded in between, comprising a honeycomb board W inside a water-tight foil cover 18. The two door shells 12, 16 have catch means 26 to 39 so that they can be detachably connected to one another whilst securing the insulation insert 14 in the correct position, which is glued intimately to the inner shell 16 before the latching process. The latter has outwardly direction folded edges 26, 28 on two mutually opposite edges, each of which each be latched to corresponding edges of the outer shell 12 by means of a folded piece 30, which has an inwardly directed stop 32. One edge of the inner shell 16 is designed with a step 26 which hooks under the stop 32 and the other is provided in the form of a catch spring with guide ramp 39 and clip edge 38. An abutment leg 35 of the step 26 and the catch spring 28 of the inner shell 16 are adapted to the depth and design of the co-operating stop 32 so that the external face of the latched inner shell 16 sits flush with a top face 34 of the folded piece 30.

For assembly purposes, the inner shell 16 together with the adhered insulation insert 14 is pushed with the step 26 underneath the folded piece 30 of the outer shell 12 until the abutment leg 35 sits tightly against the stop 32. The inner shell 16 is then latched onto the oppositely lying folded piece 30 of the outer shell 12, causing the clip edge 38 to engage underneath the stop 32 there. At the same time, the insulation insert 14 adheres to the inner face of the outer shell 12, imparting a high degree of strength to the finished joined door 10.

The finished steel furniture door 10 is ecologically harmless and can be completely recycled. To this end, it is melted together with the insulation insert, so that the honeycomb board W burns and the aluminium from the foil 18 alloys with the steel sheet. Being a strong de-oxidation and de-nitrification agent, the aluminium assists the formation of fine grains and increases the

ageing resistance of the resultant steel alloy, which has a high hardness due to nitrides. There are no toxic or environmentally harmful waste products.

All of the features and advantages highlighted in the claims, description and drawings, including construction details and spatial layouts, may be construed as essential to the invention both in their own right as well as in different combinations.

List of reference numbers

W	Honeycomb board
10	Steel furniture door
12	Outer shell
14	Insulation insert
16	Inner shell
18	Foil
20	Sealing fold
22, 24	Recess
26	Step
28	Catch spring
30	Folded piece
32	Stop
34	Top face
35	Abutment leg
36	Under-hooking leg
37	Terminal leg
38	Camber / rib / clip edge
39	Guide ramp / guide camber
40	Gripping piece / gripping hole

Claims

1. Steel furniture door (10) consisting of two sheet metal shells (12, 16) with an insulation insert (14) adhered in between, comprising a honeycomb board (W) inside a water-tight foil cover (18), characterised in that the two door shells (12, 16 are provided with catch means (26 to 39) to permit a detachable fixing to one another.

2. Door as claimed in claim 1, characterised in that one of the door shells (16) can be latched onto the other door shell (12) whilst simultaneously securing the insulation insert (14) in the correct position.

3. Door as claimed in claim 1 or 2, characterised in that the insulation insert (14) is bonded to the internal face of one door shell (e.g. 16) before the door shells are latched.

4. Door as claimed in one of claims 1 to 3, characterised in that one of the door shells (e.g. 12) has an inwardly directed edge-folded piece (30) at each of two oppositely lying edges and the other door shell (e.g. 16) has, on two mutually corresponding oppositely lying edges, outwardly directed folded edges (26; 28) with at least one part (36; 38) which can be latched on each folded piece (30).

5. Door as claimed in claim 4, characterised in that the folded piece (30) has a stop (32) directed towards the internal face of the one door shell (outer shell (12), for example a free turned-out edge, a rolled edge or a flanged edge or similar.

6. Door as claimed in claim 4 or 5, characterised in that the folded edges of the other door shell (inner shell 16) are designed as a step (26) at

one end and as a catch spring (28) at an oppositely lying edge.

7. Door as claimed in claims 5 and 6, characterised in that the step (26) extends along the one inner shell edge, essentially along its entire length, and can be secured on the stop (32), under which it engages, in at least a non-positive fit.

8. Door as claimed in claim 6 or 7, characterised in that the step (26) is of a three-legged design and has an abutment leg (35) essentially standing out from the face of the inner shell (16) at a right angle, an outwardly pointing under-hooking leg (36) extending downwards from the latter and from it a terminal leg (37) folded back in a downwards arrangement, preferably at a right angle or an acute angle.

9. Door as claimed in claims 6 to 8, characterised in that the catch spring (28) has a camber, rib or clip edge (38) which can be secured on the stop (32) in a non-positive fit.

10. Door as claimed in one of claims 6 to 9, characterised in that the catch spring (28) has a guide ramp or guide camber (39).

11. Door as claimed in one of claims 6 to 9, characterised in that the abutment leg (35) and the catch spring (28) of the inner shell (16) are adapted to match the depth and design of the respective co-operating outer shell stop (32) so that the external face of the latched inner shell (16) sits flush with a top face (34) of the outer shell folded piece (30).